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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/713,017

11/17/2003

Shaw Voon Wong

WONG3019/JEK

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09/20/2006

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EXAMINER

BUSS, BENJAMIN J

ART UNIT

PAPER NUMBER

2129

DATE MAILED: 09/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/713,017

Applicant(s)

WONG ET AL.

Examiner

Benjamin Buss

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 June 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 9-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 9-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11/17/2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

This Office Action is in response to an AMENDMENT entered 6/30/2006 for the patent application 10/713,017 filed on 11/17/2003.

The First Office Action of 2/1/2006 is fully incorporated into this Final Office Action by reference.

### *Status of Claims*

Claims 9-17 are pending.

### *Specification*

#### *Response to Arguments*

Applicant's arguments, see page 5, filed 6/30/2006, with respect to the objections to the specification have been fully considered and are persuasive. The objections to the specification have been withdrawn.

### *Claim Objections*

#### *Response to Arguments*

Applicant's arguments, see page 5, filed 6/30/2006, with respect to the claim objections have been fully considered and are persuasive. The objected claims have been cancelled, so the objections of claims 1, 3, 4, and 6 have been withdrawn.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 9 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claim recites "machining conditions including at least cutting speed **and** depth of cut **or** feed rate data" [emphasis added] which can be interpreted in at least the following two ways:

- "machining conditions including at least cutting speed and (depth of cut or feed rate data) "; or

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- "machining conditions including at least (cutting speed and depth of cut) or feed rate data".

Examiner is using the latter interpretation, so the claim limitations are met by "machining conditions including at least":

- "cutting speed and depth of cut"; *or*
- "feed rate data".

***Response to Arguments***

Applicant's arguments, see page 5, filed 6/30/2006, with respect to the rejection of claims 1-8 as being indefinite have been fully considered and are persuasive. The rejection of claims 1-8 under 35 U.S.C. §112, second paragraph has been withdrawn.

***Claim Rejections - 35 USC § 101***

***Response to Arguments***

Applicant's arguments, see page 5, filed 6/30/2006, with respect to the rejection of claim 3 as non-statutory have been fully considered and are persuasive. The rejection of claim 3 under 35 U.S.C. §101 has been withdrawn.

***Claim Rejections - 35 USC § 102***

***Response to Arguments***

Applicant's arguments, see pages 5-6, filed 6/30/2006, with respect to the rejections of:

- claims 1 and 6-7 as anticipated by Polidoro;
- claims 2 and 6-7 as anticipated by Balic; and
- claims 3 and 6-7 as anticipated by Dereli

have been fully considered and are persuasive. The rejections of claims 1-3 and 6-7 under 35 U.S.C. §102 have been withdrawn.

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**Claim Rejections - 35 USC § 103****Response to Arguments**

Applicant's arguments, see pages 5-6, filed 6/30/2006, with respect to the rejections of claims 4 and 5 as unpatentable over **Polidoro** and **Fainstein** have been fully considered and are persuasive. The rejections of

5 claims 4 and 5 under 35 U.S.C. §103 have been withdrawn.

**Claim Rejections - 35 USC § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

10 (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15 Claims 9 and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Polidoro** (USPN 5,768,137) in view of **Camera** (USPN 4,150,327).

**Claim 9:**

20 **Polidoro** teaches:

- means operative in response to input data of a workpiece, the input data comprising workpiece characteristic data (C 2-12 especially "processing input from the imaging system and the laser alignment system" C 12 L 25-30 and "laser aligned remachining of the present invention incorporates parallel platform technology for tool motion and intelligent control" C 2 L 45-60 and "controller is based on linear control
- 25 algorithms, supplemented by fuzzy logic for intelligence" C 3 L 15-35; *Examiner notes that it is clear that the imaging system and the laser alignment system obtain data on the workpiece to be machined to allow for intelligent positioning of the tool*);
- means of performing fuzzification of said input data to produce fuzzy input data (C 8-12 especially "The input to the FLC 50 is processed by the fuzzification interface 57, converting the input to the fuzzy set
- 30 domain" C 9 L 55-C 10 L 5);

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- an inference component operative to produce fuzzy output data from said fuzzy input data, the inference component including fuzzy control means for applying a set of predefined fuzzy rules to said fuzzy input data as to produce said fuzzy output data (C 8-12 especially "FIG. 16 is an illustration of a Fuzzy Logic Controller (FLC) 50" C 9 L 55-C 10 L 5 and "knowledge base 59 and decision making logic 61 that  
5 comprise the inference engine 63" C 9 L 55-C 10 L 5 and "The domain is processed by the fuzzy inference engine 63" C 9 L 55-C10 L 5; See Figure 16), wherein the fuzzy output data comprises machining conditions including at least cutting speed and depth of cut or feed rate data (C 2-12 especially "fuzzy logic algorithms ... to select feed rates and spindle speeds" C 9 L 5-35; *Examiner interprets the spindle speed to be the cutting speed of a rotary tool such as a lathe*);
- 10 - means of performing defuzzification of said output data to produce crisp output data (C 8-12 especially "output is in turn defuzzified" C 9 L 55-C 10 L 5 and "defuzzification system interface 65" C 9 L 55-C 10 L 5; "DEFUZZIFICATION" in Figure 16); and
- means of conveying said crisp output data to said machining environment (C 8-12 especially "The output is defuzzified, or converted back into a number in the real domain that is used as the control input to the  
15 process 67" C 9 L 55-C 10 L 5).

**Polidoro** fails to teach:

- the input workpiece characteristic data including at least material type and hardness of the workpiece.

**Camera** teaches:

- means operative in response to input data of a workpiece, the input data comprising workpiece  
20 characteristic data including at least a material type and hardness of the workpiece (C1-9 especially "hardness of the workpiece material" C1 L10-25 and C6 L25-45; *It is clear that the invention of Camera takes into account both the material type (e.g. "light alloy casting ... cast iron workpiece" C6 L25-45) and the hardness of the workpiece caused by "inhomogeneities such as blowholes and hard spots" C6 L25-45), for example.*);
- 25 - wherein the output data comprises machining conditions including at least cutting speed and depth of cut or feed rate data (C1-9 especially "adapting automatically the feed speed of the cutting tool" C1 L10-25);
- means of conveying said crisp output data to said machining environment (C1-9 especially "controlling the feed speed of the cutting tool" C3 L10-20).

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Motivation:

**Polidoro** and **Camera** are from the same field of endeavor, computer control of machining. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of **Polidoro** by including material type and workpiece hardness as inputs to the control system as taught by **Camera** for the benefit of taking into account the risk of premature wear of the tool due to the type of material (**Camera** C6 L25-45).

**Claim 13:****Camera teaches:**

- wherein said input data further comprises tool characteristic data and machining condition data (C1-9 especially "cutting efficiency of the tool, variation of the depth of cut, variation of the area of the surface being machined and of the hardness of the workpiece material" C1 L15-25).

**Claim 14:****Camera teaches:**

- wherein said input data further comprises cutting speed data, feed rate data, tool material data, and depth of cut data (C1-9 especially "cutting efficiency of the tool, variation of the depth of cut, variation of the area of the surface being machined and of the hardness of the workpiece material" C1 L15-25 and "working limits of the machine" C1 L25-35 and "technological characteristics of the cutting tools, the material of the work pieces and the cutting conditions" C3 L10-20; *Examiner points out that it would have been well known in the art at the time of the invention to have a feedback loop which would input the actual values of the controlled variables back into the control system*).

**Claim Rejections - 35 USC § 103**

Claims 10-12 and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Polidoro** (USPN 5,768,137) and **Camera** (USPN 4,150,327) in view of **Yamaguchi** (USPN 6,349,293).

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**Claim 10:**

The combination of **Polidoro** and **Camera** fails to teach:

- wherein said fuzzy rules are optimized according to a genetic algorithm.

**Yamaguchi** teaches:

- 5        - wherein said fuzzy rules are optimized according to a genetic algorithm (C1-13 especially C2 L20-50).

Motivation:

10        **Yamaguchi** and the combination of **Polidoro** and **Camera** are from the same field of endeavor, fuzzy control. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined teachings of **Polidoro** and **Camera** by optimizing the fuzzy rules with a genetic algorithm as taught by **Yamaguchi** for the benefit of optimizing the operation of a controller (**Yamaguchi** C2 L20-50).

**Claim 11:**

The combination of **Polidoro** and **Camera** fails to teach:

- wherein said inference component includes a multilayer neural network.

15        **Yamaguchi** teaches:

- wherein said inference component includes a multilayer neural network (C1-13 especially "Fuzzy Neural Network (FNN)" C1 L10-30; Figures 6, 10-11, & 23-25).

Motivation:

20        **Yamaguchi** and the combination of **Polidoro** and **Camera** are from the same field of endeavor, fuzzy control. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined teachings of **Polidoro** and **Camera** by including a multilayer neural network in the fuzzy inference component as taught by **Yamaguchi** for the benefit of possessing the advantages of both a fuzzy inference system and a neural network and allowing the regulation of an input-output relationship by updating coupling coefficients using a learning function (**Yamaguchi** C1 L10-30).

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**Claim 12:****Yamaguchi teaches:**

- wherein said multilayer neural network comprises a network of summation neurons and product neurons (C1-13 and especially Figures 6, 10-11, & 23-25).

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**Claim 15:****Polidoro teaches:**

- means operative in response to input data of a workpiece, the input data comprising workpiece characteristic data (C 2-12 especially "processing input from the imaging system and the laser alignment system" C 12.L 25-30 and "laser aligned remachining of the present invention incorporates parallel platform technology for tool motion and intelligent control" C 2 L 45-60 and "controller is based on linear control algorithms, supplemented by fuzzy logic for intelligence" C 3 L 15-35; *Examiner notes that it is clear that the imaging system and the laser alignment system obtain data on the workpiece to be machined to allow for intelligent positioning of the tool*);
- an inference component operative to produce output data (C 8-12 especially "inference engine 63" C9 L55-C10 L5 and "The domain is processed by the fuzzy inference engine 63" C9 L55-C10 L5; See Figure 16), the output data comprising machining condition data including at least cutting speed data (C 2-12 especially "to select feed rates and spindle speeds" C9 L5-35; *Examiner interprets the spindle speed to be the cutting speed of a rotary tool such as a lathe*);
- means of conveying said output data to said machining environment (C 8-12 especially "used as the control input to the process 67" C9 L55-C10 L5).

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**Polidoro fails to teach:**

- the input workpiece characteristic data including at least material type and hardness of the workpiece and depth of cut data.
- the inference component including a multilayer neural network, the multilayer neural network comprising a network of summation neurons and product neurons;

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**Camera teaches:**

- means operative in response to input data of a workpiece, the input data comprising workpiece characteristic data including at least a material type and hardness of the workpiece and depth of cut data (C1-9 especially "hardness of the workpiece material" C1 L10-25 and C6 L25-45 and "variation of the depth of cut" C1 L15-25; *It is clear that the invention of **Camera** takes into account both the material type (e.g. "light alloy casting ... cast iron workpiece" C6 L25-45) and the hardness of the workpiece caused by "inhomogeneities such as blowholes and hard spots" C6 L25-45), for example.);*
- an inference component operative to produce output data according to said input data, the output data comprising machining condition data (C1-9 especially "adapting automatically the feed speed of the cutting tool" C1 L10-25);
- means of conveying said output data to said machining environment (C1-9 especially "controlling the feed speed of the cutting tool" C3 L10-20).

Motivation:

**Polidoro** and **Camera** are from the same field of endeavor, computer control of machining. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of **Polidoro** by including depth of cut data, material type, and workpiece hardness as inputs to the control system as taught by **Camera** for the benefit of taking into account the risk of premature wear of the tool due to the type of material (**Camera** C6 L25-45).

The combination of **Polidoro** and **Camera** fails to teach:

- said inference component including a multilayer neural network, the multilayer neural network comprising a network of summation neurons and product neurons;

**Yamaguchi** teaches:

- said inference component including a multilayer neural network, the multilayer neural network comprising a network of summation neurons and product neurons (C1-13 especially "Fuzzy Neural Network (FNN)" C1 L10-30; Figures 6, 10-11, & 23-25).

Motivation:

**Yamaguchi** and the combination of **Polidoro** and **Camera** are from the same field of endeavor, fuzzy control. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify

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the combined teachings of **Polidoro** and **Camera** by including a multilayer neural network in the fuzzy inference component as taught by **Yamaguchi** for the benefit of possessing the advantages of both a fuzzy inference system and a neural network and allowing the regulation of an input-output relationship by updating coupling coefficients using a learning function (**Yamaguchi** C1 L10-30).

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**Claim 16:****Camera** teaches:

- wherein said input data further comprises tool characteristic data and machining condition data (C1-9 especially "cutting efficiency of the tool, variation of the depth of cut, variation of the area of the surface being machined and of the hardness of the workpiece material" C1 L15-25).

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**Claim 17:****Camera** teaches:

- wherein said input data further comprises cutting speed data, feed rate data, tool material data, and depth of cut data (C1-9 especially "cutting efficiency of the tool, variation of the depth of cut, variation of the area of the surface being machined and of the hardness of the workpiece material" C1 L15-25 and "working limits of the machine" C1 L25-35 and "technological characteristics of the cutting tools, the material of the work pieces and the cutting conditions" C3 L10-20; *Examiner points out that it would have been well known in the art at the time of the invention to have a feedback loop which would input the actual values of the controlled variables back into the control system*).

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**New Claims****Response to Arguments**

Applicant's arguments with respect to claims 9-17 have been considered but are moot in view of the new ground(s) of rejection. The above rejections clearly show that the combination of **Polidoro** and **Camera** does disclose input data including at least material type and hardness and depth of cut to produce output data including at least cutting speed and either depth of cut or feed rate. The combination of **Polidoro**, **Camera**, and **Yamaguchi** is shown to disclose a multilayer neural network comprising a network of summation and product neurons.

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### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Kaji (USPN 6,735,576)
- Kermani (USPN 6,853,991)
- Lee (USPN 5,774,630)
- Hung (USPN 5,727,130)
- Ulyanov (USPN 6,496,761)

Claims 9-17 are rejected.

### ***Correspondence Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Benjamin Buss whose telephone number is 571-272-5831. The examiner can normally be reached on M-F 9AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Vincent can be reached on 571-272-3080. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.


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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the

5 Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Benjamin Buss  
Examiner  
Art Unit 2129

BB

 9/14/06  
DAVID VINCENT  
SUPERVISORY PATENT EXAMINER